

820 HEAT AND REFRIGERATION (A/C)

The requirements for heat, hot water, and industrial steam at Naval installations will be based on an engineering study of the overall station demand. A central heating facility will include a heating plan, fuel storage, distribution system, and controls. Planning information for heating facilities under the following basic category codes:

Code 821 Heat, Steam--Source

Code 822 Heat, Transmission and Distribution Lines

Code 823 Heat, Gas--Source

Code 824 Heat, Gas--Transmission

Code 826 Refrigeration/Air Conditioning

821 HEAT--SOURCE

The source of heat from steam or high temperature water (HTW) includes a complete central plant and associated fuel storage. The source of heat and steam/HTW are coded to indicate the type of fuel used by the plant. The Navy codes are as follows:

821-09 HEATING PLANT BUILDING (SF)

821-12 HEATING PLANT-FOSSIL FUEL - MEDIUM (MB)

821-22 HEATING PLANT-FOSSIL FUEL - LARGE (MB)

821-40 STEAM PLANT-NUCLEAR, ALL SIZED (MB)

821-50 STEAM PLANT-NONNUCLEAR (MB)

821-09--821-50 HEATING PLANTS

A central heating plant will include a structure, piping, equipment, controls, fuel, storage, and all equipment necessary to make a complete usable facility. Central heating plants are justified only when the total owning and operating costs for central plants and distribution systems are less than similar costs for heating systems in individual buildings. Central heating plants are also justified when the overall energy use for providing heat from extraction steam in a steam-electric-power plant would be less than a central plant plus purchased electricity. The type of fuel for the plant, whether an electric power generating plant with by-product heat and steam, or a heating plant, will be selected on the basis of an economic analysis. The heating plant capacity will be based on BTU rating, and this rating will be determined from an engineering analysis of the need for steam, heat, and hot water at the station. The standard drawings in Definitive Designs, NAVFAC P-272, give the estimated heating requirements in MBTU/HR required to maintain inside temperature of +70°F for outside design temperatures of -5°F, +5°F, +15°F, and +25°F. the standard drawings also indicate hot water requirements. For planning purposes, central heating plant capacities (in thousands of BTU/HR) for installations in the above temperature ranges may be determined by totalling the heating requirements (MBTU's/HR) for all existing and/or planned station buildings. Heating plants of various types and sizes are shown in Definitive Designs, NAVFAC P-272, Part 2.

821 60 DISTILLATE HEATING FUEL OIL STORAGE (GA)

821 61 RESIDUAL HEATING FUEL OIL STORAGE (GS)

These two category codes replace category code 124-65, Activity Heating Fuel Storage, which applied to the storage of both distillate and residual heating fuel oils. These fuel oil tanks store oil used for heating buildings, generation of steam, power plant requirements, and for other heat generating facilities as required.

The following criteria pertains to both category codes 821-60 and 821-61. The planning factor is based upon the combined fuel oil consumption at the activity for heating.

The amount of storage varies with the number of personnel attached to the station and the activity. In temperature zones the normal average consumption is 70 gallons per person per month (including civilian employees). This figure would of necessity be revised in zones of extreme temperatures. Use this planning factor only if historical data is not available.

Department of Defense policy is that heating plants burning fuel oil must have a minimum of 30 day storage capability based on the coldest 30 day requirement. Installations which have direct access to and/or are supported directly by major military bulk fuel distribution systems should establish storage requirement based on detailed support agreement with the supply terminal Command. Installations which do not have direct access to major fuel distribution systems should investigate logistic support factors (transportation modes; delivery times; precipitation, temperature and weather histories; etc.) to determine if it may be necessary to have storage capability exceeding the 30 day requirements. Activities utilizing fuels for dual purposes (i.e., diesel fuel for heating/transportation) should consider combined consumption when computing storage requirements. Installations should fill all storage tanks by late summer each year in order to reduce cold weather delivery problems, and tanks should be kept as full as possible at all times. This policy has been promulgated by OPNAV Instruction 4100.6 series. Additional justification is necessary for the fuel requirements associated with the generation of steam, operation of power plants, etc. The same 30 day storage requirement is also applicable.

The category codes and corresponding types of oil stored by each facility are as follows:

Category Code 821-60:

Grade No. 1. A light distillate oil intended for use in burners of the vaporizing type in which the oil is converted to a vapor by contact with a heated surface or by radiation. (Includes kerosene and JP-5 aviation turbine fuel).

Grade No. 2. A heavier distillate than grade no. 1. It is intended for use in atomizing-type burners which spray the oil into a combustion chamber where the tiny droplets burn while in suspension. The grade of oil is used in most domestic burners and in many medium-capacity commercial-industrial burners where its ease of handling and ready availability sometimes justify its higher cost over the residual grade S. (Includes Diesel Marine Fuel (DMF), DF-2 and commercial diesel fuels).

Grade No. 4. Usually a light residual but sometimes a heavy distillate. It is intended for use in burners equipped with devices that atomize oils of higher viscosity than domestic burners can handle. Its permissible viscosity range allows it to be pumped and atomized at relatively low storage temperatures. Thus, except in extreme cold weather, it required no preheating for handling.

Category Code 821-61:

Grade No. 5 (light). A residual fuel of intermediate viscosity for burners capable of handling fuel more viscous than grade no. 4 without preheating. Preheating may be necessary in some types of equipment for burning and in colder climates for handling. (Includes Navy Special Fuel Oil (NSFO)).

Grade No. 5 (heavy). A residual fuel more viscous than grade no. 5 (light). It is intended for similar service. Preheating may be necessary in some types of equipment for burning and in colder climates for handling.

Grade No. 6. A high-viscosity oil, sometimes referred to as "Bunker C", and used mostly in commercial and industrial heating. It requires preheating in the storage tank to permit pumping and additional preheating at the burner to permit atomizing. The extra equipment and maintenance required to handle this fuel usually preclude its use in small installations.

822 HEAT - TRANSMISSION AND DISTRIBUTION LINES

This basic category encompasses the transmission and distribution lines for steam and associated hot water lines throughout an installation. In temperate and tropical climates, and at locations where the water table is high, steam lines will be aboveground. Routing of steam or hot water lines requiring underground installation under runways and taxiways should be held to a minimum to avoid interference by maintenance and repair operations. Adequate clearances shall be provided above roads, railroads, streets, walks, and tow-ways. Other restrictions such as flight clearances must be maintained, see Category Code Ill-Supplement. Steam and hot water transmission lines are coded as follows:

822-09 STEAM/HEAT BUILDING/SHELTER (SF)

822-12 STEAM LINES FROM MEDIUM PLANTS (LF)

822-14 CONDENSATE LINES TO MEDIUM PLANTS (LF)

822-16 HOT WATER OR HTW/HP LINES TO MEDIUM PLANTS (LF)

822-22 STEAM LINES FROM LARGE PLANTS (LF)

822-24 CONDENSATE LINES TO LARGE PLANTS (LF)

822-26 HOT WATER OR HTW/HP LINES FROM LARGE PLANTS (LF)

The requirement for steam and condensate or hot water pipelines is determined from an engineering study.

823 HEAT, GAS--SOURCE

This basic category includes a central plant for generation of gas and related facilities and appurtenances, including connected fuel storage for plant operation and storage of gas for direct heating or as a fuel for central plants. Gas generating and storage facilities are coded as follows:

- 823 09 GAS GENERATING BUILDING (SF)**
- 823 10 GAS GENERATING PLANT (MB)**
- 823 15 GAS METER SHED/SHELTER (SF)**
- 823 20 GAS STORAGE TANKS (CF)**

See NAVFAC DM-3, Mechanical Engineering, and Code 411 60 herein, for information on the receipt, storage, distribution and vaporizing capacities of Liquefied Petroleum Gases (LPG).

824 HEAT, GAS--TRANSMISSION

This basic category applies to exterior lines, mains, and systems for transmission of gas for direct heating or as fuel for central plants.

824 10 GAS MAINS (LF)

The planning of gas pipelines includes trenching, piping, valve boxes, controls, and meters. The pipe capacity, strength, and linear footage requirements will be determined by an engineering study.

826 REFRIGERATION/AIR CONDITIONING

This category code group is for chilled water and air conditioning plants over 25 tons capacity. Exclude cold storage facilities (see Category Code 430 series). For air conditioning plants of 5 to 25 ton capacity, use Category Code 890 42. this group includes the following individual category codes:

826 10 REFRIGERATION/AIR CONDITIONING PLANT BUILDING (SF)

826 20 CHILLED WATER PLANT 25-100 TONS (TN)

826 25 CHILLED WATER PLANT OVER 100 TONS (TN)

826 30 AIR CONDITIONING PLANT 25-100 TONS (TN)

825 40 AIR CONDITIONING PLANT OVER 100 TONS (TN)

826 10--826 40 REFRIGERATION/AIR CONDITIONING PLANTS

A central refrigeration/air conditioning plant will include a structure with all equipment necessary to make a complete usable facility. If cooling towers are to be used for heat rejection, prevailing winds shall be considered when siting the facilities to avoid problems with moisture drift from the cooling towers; i.e., parking facilities should not be downwind from cooling towers. Vehicle access for equipment maintenance and replacement should be considered. Central plants should be considered when a life cycle cost analysis demonstrate that the owning and operating cost of the plant will be less than that for individual building refrigeration equipment. The drawings in Definitive Designs, NAVFAC P-272, give the estimated cooling loads in MBTU/HR required to maintain inside design conditions at 75°F, 50° relative humidity with outside design conditions of 95°F, db; 78°F, wb. For planning purposes, central refrigeration/air conditioning plant capacities can be determined by totaling the cooling requirements for all existing and for planned station buildings.

827 CHILLED WATER-AIR CONDITIONING TRANSMISSION/DISTRIBUTION

This basic category encompasses the transmission/distribution of chilled water from a central refrigeration/air conditioning plant to buildings throughout an installation for space air conditioning with water being returned to the plant. Routing of chilled water lines under runways, taxiways, buildings, etc., should be held to a minimum to avoid interference by maintenance and repair operations to the chilled water lines. If lines are located above ground, adequate clearances shall be provided above roads, railroads, walks and tow-ways. Other restrictions such as flight clearance must be considered. See NAVFAC Publication P-80.3. Underground lines have the advantage of reducing undesired heat gains and may not require insulation, depending on ground temperatures.

827-10 AIR CONDITIONING VALVE HOUSE/SHED/SHELTER (SF)

**827-20 AIR CONDITIONING-CHILLED WATER TRANSMISSION/DISTRIBUTION SYSTEM
MEDIUM (25-100 TONS) (LF)**

**827-25 AIR CONDITIONING-CHILLED WATER TRANSMISSION/DISTRIBUTION SYSTEM
LARGE (OVER 100 TONS) (LF)**

See NAVFAC DM-3, Mechanical Engineering for design information.